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# TURFGRASS PEST CONTROL

University of Illinois at Urbana-Champaign
College of Agriculture • Cooperative Extension Service
Circular 1076

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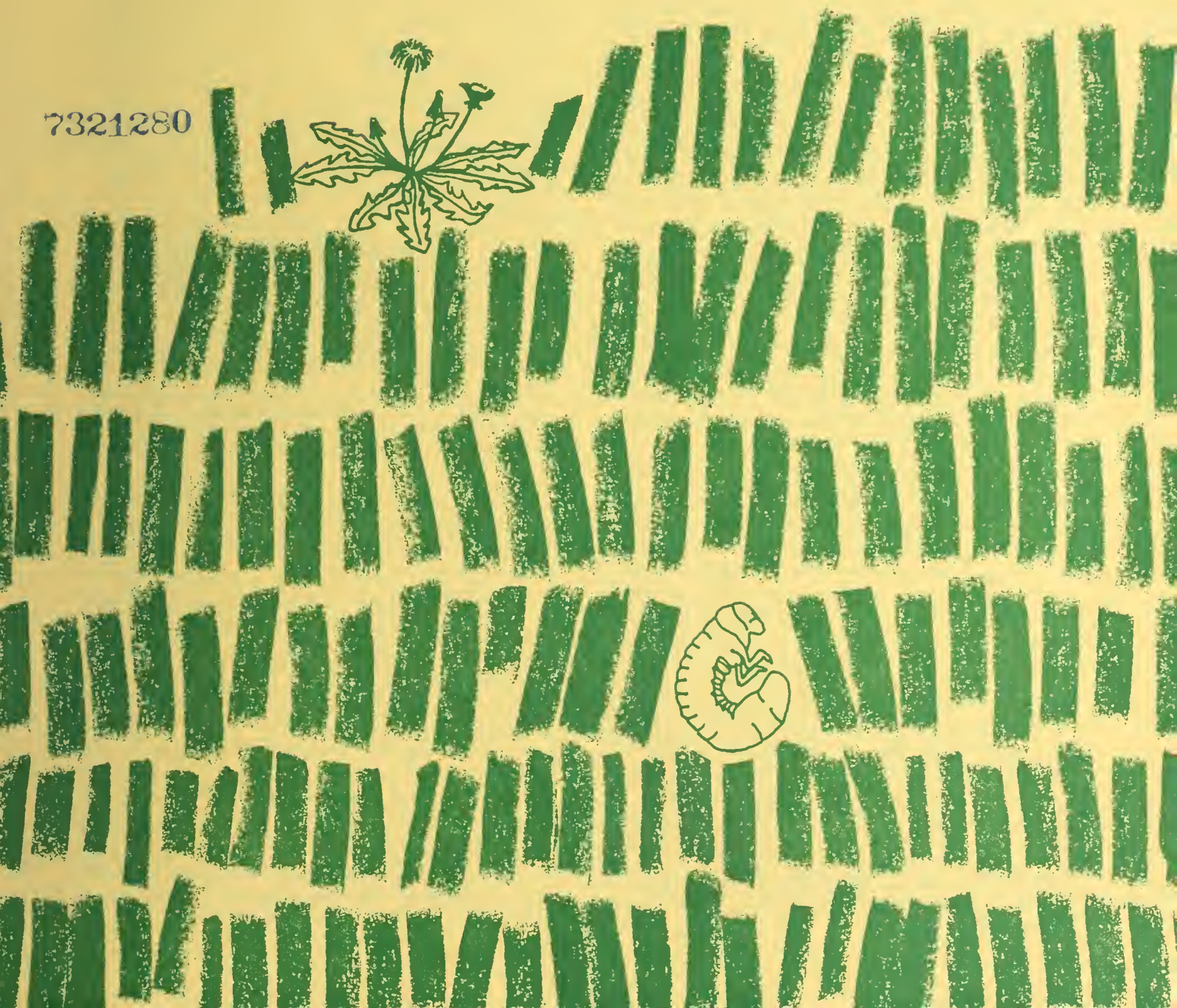

With the introduction of improved management techniques and new, more effective materials, turfgrass culture has developed into a highly sophisticated technology. Among the new materials are the modern pesticides that control weeds, diseases, and insects. Proper irrigation, mowing, and fertilization practices remain the principal defenses against turfgrass pests; it is sometimes necessary, however, to complement the turfgrass cultural program with the intelligent selection and use of pesticides.

**Pesticide formulations.** Pesticides are chemicals that are active against one or more turfgrass pests. These chemicals are generally formulated as liquid concentrates — solutions (S) and emulsifiable concentrates (EC) — wettable powders (WP), and granules (G). Liquid concentrates and wettable powders are usually added to water and applied to the turf with a sprayer. Granular materials can be applied with a fertilizer spreader.

**Active ingredients.** Pesticides must be accurately applied at correct rates to yield optimum results. Too little may control pests ineffectively; too much may injure the turf. The specific amount of material that should be applied depends upon the concentration of the pesticide (the "active ingredient") in the commercial preparation.

Concentration is usually expressed as a weight per unit volume or as a percent of the commercial preparation. For example, a 50 percent wettable powder is 50 percent active ingredients (a.i.) and 50 percent inert carrier. If the recommended rate of application is 12 pounds a.i. per acre, then 24 pounds of this commercial preparation are required to treat one acre. This is roughly equivalent to ½ pound per 1,000 sq. ft. (43,560 sq. ft. = 1 acre).

Liquid formulations generally list the number of pounds of the active ingredient per gallon (lb. a.i./gal.) on the pesticide label. If the concentration is 4 lb./gal., then one quart of the product is required per acre to supply 1 pound of active ingredient per acre.

**Precautions.** Pesticides should be stored in their original containers with the label securely attached. Keep them in a cool, dry place that is inaccessible to children, pets, and irresponsible persons. Read the label before using the pesticide and follow all instructions carefully. A few minutes spent studying the information on a pesticide label may prevent misuse and needless accidents.

## WEED CONTROL

Herbicides are pesticides that control one or more plant species. They may be classified into one of three types — contact, systemic, or soil sterilant — depending upon the nature of their activity on plants.

*Contact herbicides* kill plant parts covered by the chemical. Paraquat, a contact herbicide, is useful in renovating turfs infested with extensive populations of annual weeds. Because paraquat has low soil residual activity, treated areas may be reseeded soon after chemical application.

*Systemic herbicides,* absorbed by plant organs and translocated throughout the plant, may be either *selective,* killing certain weeds without injuring desirable grasses, or *nonselective,* controlling all vegetation. Mecoprop is a selective herbicide used to control broadleaf weeds in turf. Dalapon, a nonselective herbicide, is used to kill perennial weedy grasses such as quackgrass that cannot be controlled by selective herbicides.

*Soil sterilants* are chemicals that render the soil toxic to all plant life. How long the soil remains sterile depends

**Table 1. — Chemical Control of Broadleaf Weeds in Turf**

| | 2,4-D[a] | Silvex[b] | Mecoprop[c] | Dicamba[d] |
|---|---|---|---|---|
| (S = susceptible; I = intermediate control; R = resistant) | | | | |
| Black medic | R | S-I | I | S |
| Carpetweed | S | I | I | S |
| Chickweed, common | R | S | S-I | S |
| Chickweed, mouse-ear | R | S | S-I | S |
| Chicory | S | S | S | S |
| Daisy. oxeye | I | I | I | I |
| Dandelion | S | S | S-I | S |
| Dock, curly | I | I-R | I-R | S |
| Ground ivy | I-R | S-I | I | S-I |
| Hawkweed | S-I | R | R | S-I |
| Henbit | I | S | I | S |
| Knotweed | R | I | I | S |
| Lambsquarters | S | S | S | S |
| Mallow, roundleaf | I-R | S-I | I | S-I |
| Plantain, broadleaf | S | I | I-R | R |
| Plantain, buckhorn | S | I | I-R | R |
| Purslane | I | S-I | R | S |
| Red sorrel | R | I | R | S |
| Speedwell, creeping | R | R | R | R |
| Speedwell, purslane | I | I | I | I |
| Spurge, prostrate | I-R | I | I | S-I |
| Thistles | S-I | S-I | I | S |
| White clover | I | S | S | S |
| Wild carrot | S | S-I | S-I | S |
| Wild onion | I | R | R | S-I |
| Woodsorrel, yellow | I | S-I | I | I |
| Yarrow | I | I-R | I-R | S |

[a] A basic herbicide for use in combination with one or more of the others for broad-spectrum postemergence control of broadleaf weeds. Standard rate of application is 1 lb./A. Not recommended for use on bentgrass putting greens.

[b] Should not be used on bentgrass turf. Apply at ½ to ¾ lb./A. plus 2,4-D at the standard rate.

[c] Safe for use on bentgrass putting greens at ½ to 1 lb./A. during cool weather periods. Can apply to general turf at 1 lb./A. with 2,4-D.

[d] A very effective herbicide for broadleaf weed control when combined with 2,4-D or as a 3-way combination. Use at ¼ lb./A. with 2,4-D; use at ⅛ lb./A. with 2,4-D + silvex or with 2,4-D + mecoprop. Do not apply above roots of trees and shrubs.

***This circular was prepared by A. J. Turgeon, Assistant Professor, Department of Horticulture; M. C. Shurtleff, Professor, Department of Plant Pathology; and R. Randall, Assistant Professor, Agricultural Entomology.***

upon the material used, the rate of application, and the prevailing environmental conditions that affect decomposition of the herbicide in the soil. Soil sterilants have no place in turfgrass management; however, they are useful in preventing plant growth under fences and other areas that are difficult to mow.

Herbicides may be applied to prevent weeds from infesting a turf or to control weeds already present. Ben-

Table 2. — Chemical Control of Weed Grasses in Turf

| Weeds | Life length | Herbicide | Rate (lbs. a.i. per acre) | Remarks |
|---|---|---|---|---|
| Annual bluegrass | annual or perennial | arsenates, lead and calcium | 260 | Apply in late summer and again in early spring until selective toxicity is achieved. Then in late summer use only half the recommended rate to maintain arsenate toxicity. Omit phosphorus from fertilization program. Do not use on poorly drained sites. Apply at lower rates on bentgrass turf very carefully, for too heavy an application can damage bentgrass. |
| | | benefin (Balan) | 3 | Apply in early spring and late summer. Do not use on bentgrass putting greens. |
| | | bensulide (Betasan) | 12 | Apply in late summer before the return of cool weather to prevent development of new plants. Fairly safe for use on bentgrass putting greens. |
| | | DCPA (Dacthal) | 12 | Apply in early spring and late summer. Do not use on bentgrass putting greens. |
| | | endothall (Endothal) | ¾ | Apply during warm weather in late summer to Kentucky bluegrass turf. Repeat in two weeks if necessary. After last application, as annual bluegrass turns brown, overseed with desirable grasses or insert plugs of sod into large bare areas to promote rapid healing. Has little or no preemergence activity. |
| Crabgrass<br>Foxtails<br>Barnyardgrass | annual | benefin (Balan) | 2 | Apply before emergence of crabgrass in early spring. Not recommended for use on bentgrass turf. |
| | | bensulide (Betasan) | 12 | Apply before emergence of crabgrass in early spring. |
| | | DCPA (Dacthal) | 12 | Apply before emergence of crabgrass in early spring. May injure bentgrasses and fine-leaf fescues. |
| | | siduron (Tupersan) | 10 | Apply before emergence of crabgrass in early spring. Use at half the recommended rate in conjunction with seeding Kentucky bluegrass. May injure some bentgrasses and fine-leaf fescues. Do not use on bermudagrass. |
| | | organic arsenicals (DSMA, MSMA, etc.) | follow labels | Apply soon after emergence of crabgrass. Three applications at 7- to 10-day intervals are usually required. May cause some discoloration of the turf. |
| Goosegrass | annual | DCPA (Dacthal) | 12 | Goosegrass is harder to control than crabgrass; complete control is rarely achieved. |
| | | organic arsenicals (DSMA, MSMA, etc.) | follow labels | Apply soon after emergence. Three or more applications at 7- to 10-day intervals may be required for control. May cause some discoloration of the turf. |
| Tall fescue<br>Bentgrass<br>Nimblewill | perennial | amitrole<br>dalapon<br>amitrole + dalapon | 4<br>10<br>2 + 5 | These give nonselective control. Amitrole and dalapon may persist in the soil for up to 4 and 6 weeks, respectively. Overseeding should be delayed until chemical residues have dissipated. |
| | | paraquat | 1 | This gives nonselective control. Paraquat is highly toxic and should not be used by homeowners. It has no residual activity. Two successive applications may be required for control. |
| Quackgrass<br>Bermudagrass | perennial | amitrole + dalapon | 2 + 5 | This gives nonselective control and may require more than one application. Effectiveness of control is enhanced by soil cultivation after foliage has turned brown. Wait at least 6 weeks before seeding. |
| | | methyl bromide | 436 | Soil fumigant; must be applied under a sealed polyethylene tarp. Do not apply over roots of trees and shrubs. Professional use only. |
| Nutsedge | perennial | organic arsenicals (DSMA, MSMA, etc.) | follow labels | Treat soon after emergence before new nutlets form. Repeat application as soon as new growth is evident. |
| | | 2,4-D | 1 | Apply when actively growing. Repeat application as often as necessary to control new growth. |

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sulide is a *preemergence* herbicide that is applied in spring to prevent the development of crabgrass. Once the weed has germinated, however, DSMA may be used as a *postemergence* treatment to selectively control the crabgrass invader.

## INSECT CONTROL

Insecticides are pesticides that reduce insect populations below levels that are injurious to turf. Although insecticide chemistry is quite varied, most of the commonly used materials act as contact poisons. Effective control is dependent upon ensuring contact between the insect and the insecticide. Therefore, control of soil-inhabiting insects (such as grubs) is best achieved by drenching the insecticide into the soil, whereas foliar-feeding insects (for example, sod webworms) should be controlled by a foliar spray with no irrigation or rainfall for at least 24 hours.

Most insecticide applications are curative — the insect is controlled after the early signs of injury have been observed. One exception, however, is chlordane, a preventive insecticide: a single application should provide preventive grub control for five years or more.

No single insecticide will control all insect pests found in turf. Identify the specific insect before attempting control with an insecticide. Learn to recognize the early signs of injury from insects to avoid wide-scale loss of turf.

## DISEASE CONTROL

Fungicides are pesticides that kill or inhibit the growth of disease-causing fungi. Depending upon the manner in which they protect plants against infection, fungicides are of two general types: protective-contact fungicides and systemic fungicides.

*Protective-contact fungicides* are applied to seed, foliage, or soil to keep disease-causing fungi from entering plants. This kind of fungicide must be applied fairly frequently to turf (7- to 14-day intervals) since mowing and irrigation remove much of the surface chemical soon after application. Relatively high spray volumes (5 gal. water per 1,000 sq. ft.) are required to supply uniform and continuous coverage of the foliage by the fungicide. Adding spreader-stickers (surfactants) to the spray mixture facilitates good foliar coverage. Most of the available fungicides for turf are the protective-contact type.

*Systemic fungicides,* or chemotherapeutants, are absorbed and distributed within the plant, destroying established infections and controlling certain diseases for several weeks or months. These fungicides are absorbed principally by the roots and hence should be drenched or watered in for best results. Examples of systemic fungicides include benomyl (Tersan 1991), chloroneb (Tersan SP), TBZ (Tobaz, Mertect), and ethazol (Koban).

Table 3. — Chemical Control of Insects

| Insect | Insecticide[a] | Dosage per 1,000 sq. ft. | Suggestions |
|---|---|---|---|
| True white grubs<br>Annual white grubs<br>Japanese beetle larvae<br>Green June beetle larvae<br>Ants | chlordane 45% EC<br>40% WP<br>10% G<br>5% G | 4 fl. oz.<br>5 oz.<br>1¼ lb.<br>2½ lb. | This treatment provides 5-year protection. In established sod, apply as granules or spray to small area and then water in very thoroughly before treating another small area. For new seedings, mix in soil before planting. Do not plant vegetable root crops in treated soil for 5 years. As emergency treatment for severe grub infestation, apply 8 fl. oz. of diazinon 25% EC per 1,000 sq. ft. and water in very thoroughly. |
| Ants<br>Cicada killer and other soil-nesting wasps | diazinon 25% EC<br>2% G | 6 fl. oz.<br>5 lb. | Apply as spray or granules and water in thoroughly. For individual nests pour 1% diazinon in nest and seal in with soil. |
| Soil webworms<br>Millipedes and sowbugs | carbaryl 50% WP<br>5% G<br>diazinon 25% EC<br>2% G<br>Dursban 2E 22.4% EC<br>½% G | ½ lb.<br>4 lb.<br>6 fl. oz.<br>5 lb.<br>1½ fl. oz.<br>5 lb. | As sprays, use at least 2½ gal. water per 1,000 sq. ft. Do not water for 72 hours after treatment. As granules, apply from fertilizer spreader. |
| Armyworms<br>Cutworms<br>Chinch bugs | carbaryl 50% WP<br>5% G<br>Dursban 2E 22.4% EC<br>½% G | 2 oz.<br>1 lb.<br>1½ fl. oz.<br>5 lb. | Apply as sprays or granules. Use 5 to 10 gal. of water per 1,000 sq. ft. |
| Leafhoppers | carbaryl 50% WP<br>methoxychlor 25% EC | 2 oz.<br>2 oz. | Apply as a spray. |
| Aphids | malathion 50% to 57% EC | 1 tbsp. | Spray grass thoroughly. |
| Mites | dicofol 18½% EC<br>malathion 50% to 57% EC | 1 tbsp.<br>1 tbsp. | Spray grass thoroughly, 2 to 2½ gal. water per 1,000 sq. ft. |

[a] Use any of the insecticides recommended for a given group of insects, being sure to use the proper dosage for the formulation chosen. Follow labels.

## Table 4. — Chemical Control of Turfgrass Diseases

| Diseases[a] | Principal turfgrasses affected | Normal season and intervals of application | Fungicide preparations (oz. per 1,000 sq. ft.)[b] |
|---|---|---|---|
| Helminthosporium diseases | | | |
| Melting-out (*H. vagans*) | Kentucky bluegrass<br>Ryegrasses | March-June;<br>Sept.-Nov.<br>7 to 14 days | Acti-dione — Thiram (2 to 4 oz.)<br>Folpet (Phaltan) WP 50% (4 to 6 oz.)<br>Captan WP 50% (4 to 6 oz.)<br>Daconil 2787 WP 75% (4 oz.)<br>Ortho Lawn & Turf Fungicide (4 to 6 oz.)<br>Dyrene WP 50% (4 to 8 oz.)<br>Fore WP 80% (4 to 6 oz.)<br>Zineb WP 75% (4 to 6 oz.)<br>Tersan LSR WP 80% (4 to 6 oz.)<br>Manzate 200 WP 80% (4 to 6 oz.) |
| Helminthosporium leaf spot (*H. sorokinianum*) | All turfgrasses | June-August<br>7 to 14 days | |
| Zonate eyespot (*H. giganteum*) | Bluegrasses<br>Bermudagrass<br>Fescues<br>Ryegrasses | July-August<br>7 to 14 days | |
| Red leaf spot (*H. erythrospilum*) | Bentgrasses | April-August<br>7 to 14 days | |
| Helminthosporium blight (*H. dictyoides*) | Fescues<br>Ryegrasses | April-July<br>7 to 14 days | |
| Brown blight (*H. siccans*) | Ryegrasses<br>Fescues | April-June<br>7 to 14 days | |
| Leaf blotch (*H. cynodontis*) | Bermudagrass | April-June<br>7 to 14 days | |
| Fusarium blight (*F. roseum*) | Bentgrasses<br>Fescues | April-Sept.<br>7 to 10 days | Tersan 1991 WP 50% (5 to 6 oz.) |
| | Bluegrasses (esp. "Merion" and "Windsor" Kentucky)<br>Ryegrasses | June-August<br>7 to 10 days | *Comments:* Drench 50 gal. water per 1,000 sq. ft. into root zone. Water turf the day before. |
| Sclerotinia dollar spot (*S. homeocarpa*) | All turfgrasses | May-Nov.<br>7 to 14 days | Acti-dione — Thiram (2 to 4 oz.)<br>Daconil 2787 WP 75% (2 to 4 oz.)<br>cadmium compound (see label)<br>Mertect WP 60% (2 oz.)<br>Thiram WP 75% (2 to 4 oz.)<br>Tobaz WP 60% (2 oz.)<br>Ortho Lawn & Turf Fungicide (4 to 6 oz.)<br>Tersan 1991 WP 50% (½ to 1 oz.)<br>Dyrene WP 50% (4 to 6 oz.) |
| | | | *Comments:* Resistance to cadmium compounds, Dyrene, and other fungicides has been reported in some areas. |
| Rhizoctonia brown patch (*R. solani*) | All turfgrasses | June-Sept.<br>5 to 10 days | Dyrene WP 50% (4 to 6 oz.)<br>Daconil 2787 WP 75% (4 oz.)<br>Fore WP 80% (4 to 6 oz.)<br>Tersan LSR WP 80% (4 to 6 oz.)<br>Tersan 1991 WP 50% (1 to 4 oz.)<br>Acti-dione — Thiram (3 to 4 oz.)<br>Ortho Lawn & Turf Fungicide (4 to 6 oz.)<br>Mertect WP 60% (2 oz.)<br>Tobaz WP 60% (2 oz.)<br>Manzate 200 WP 80% (4 to 6 oz.) |
| Leaf smuts | | | |
| Stripe smut (*Ustilago striiformis*)<br>Flag smut (*Urocystis agropyri*) | Bentgrasses<br>Bluegrasses (esp. "Merion" Kentucky)<br>Ryegrasses | Early spring or late fall | Tersan 1991 WP 50% (6 to 12 oz.) |
| | | | *Comments:* After application, irrigate with 50 gal. water per 1,000 sq. ft. to drench fungicide into the root zone. |
| Rusts: leaf and stem (*Puccinia* species) | All turfgrasses | July-Sept.<br>7 to 10 days | Acti-dione — Thiram (2 to 4 oz.)<br>Tersan LSR WP 80% (2 to 4 oz.)<br>Fore WP 80% (2 to 4 oz.)<br>Zineb WP 75% (2 to 4 oz.)<br>Manzate 200 WP 80% (2 to 4 oz.)<br>Thiram WP 75% (2 to 4 oz.)<br>Ortho Lawn & Turf Fungicide (4 to 6 oz.)<br>Daconil 2787 WP 75% (4 oz.) |
| | | | *Comments:* Follow fertility and irrigation practices to produce a steady growth of grass — 1 inch a week — during summer or early fall drouths. |
| Powdery mildew (*Erysiphe graminis*) | Bluegrasses<br>Fescues<br>Bermudagrass | May-Nov.<br>7 to 14 days | Acti-dione — Thiram (2 to 4 oz.)<br>Karathane WD WP 22.5% (¼ to ½ oz.)<br>Tersan 1991 WP 50% (1 to 3 oz.) |

*(Footnotes appear at end of next page.)*

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Table 4. — Chemical Control of Turfgrass Diseases (continued)

| Diseases[a] | Principal turfgrasses affected | Normal season and intervals of application | Fungicide preparations (oz. per 1,000 sq. ft.)[b] |
|---|---|---|---|
| Snow molds<br>Typhula blight[c] (*T. itoana, T. incarnata*)<br>Fusarium patch[d] (*F. nivale*) | All turfgrasses | Late fall to mid-spring | Tersan SP WP 65% (6 to 9 oz.)<br>Ortho Lawn & Turf Fungicide (6 to 12 oz.) |
| Pythium blight, grease spot, spot blight (*P. aphanidermatum, P. irregulare, P. ultimum, P. torulosum, P. catenulatum, P. dissotocum*) | All turfgrasses | June-Sept.<br>5 to 7 days | Koban WP 35% (3 to 6 oz.)<br>Tersan SP WP 65% (4 oz.)<br>*Comments:* Apply fungicide in 10 gal. water per 1,000 sq. ft. |
| Fairy rings (*Marasmius oreades, Lepiota morgani, Agaricus campestris*) | All turfgrasses | | methyl bromide, chloropicrin, or formaldehyde fumigation (see labels)<br>*Comments:* Soil temperature should be above 60° F. for fumigation. Cover area with gas-proof cover for several days.<br>*or*<br>Instead of treating with fungicide, use root-feeder attachment on hose to drench rings with water. |
| Seed rot, damping-off, seedling blights (*Pythium* sp., *Fusarium* sp., *Rhizoctonia solani, Helminthosporium* sp., *Colletotrichum graminicolum*) | All turfgrasses | Treat seed before planting.<br>Spray at early seedling emergence and 7 to 10 days later. | Captan or Thiram 50% to 75% (see label)<br>Folpet (Phaltan) WP 50% (2 to 4 oz.)<br>Captan WP 50% (2 to 4 oz.)<br>Dyrene WP 50% (2 to 4 oz.)<br>Kromad (4 to 6 oz.)<br>Daconil 2787 WP 75% (2 to 4 oz.)<br>Zineb WP 75% (2 to 4 oz.)<br>Thiram WP 75% (2 to 4 oz.)<br>Ortho Lawn & Turf Fungicide (4 oz.)<br>*Comments:* Apply fungicide in 5 gal. water per 1,000 sq. ft. |
| Nematodes (many genera and species) | All turfgrasses | | *All grasses except bentgrass:* Mix 1.5 to 2 pints of Nemagon EC-2 or Fumazone 70E with 10 to 15 gal. of water and drench 1,000 sq. ft. of turf. Water turf immediately to ensure penetration of nematicide into soil and to prevent toxic effects. Treat in spring or fall (or both, if nematodes are a serious problem) when soil temperature is above 60° F. Aerifying turf before application improves results. *Do not apply* chemical to newly seeded areas.<br>*Bentgrass:* Use only 1 pint of nematicide; otherwise, follow above instructions. *Handle with extreme care*, as nematicides are toxic to people and plants. |
| Slime molds (*Physarum cinereum, Fuligo* sp.) | All turfgrasses | May-Sept. | *Comments:* Use any fungicide in this table when disease is first evident.<br>*or*<br>Mow, rake, pole, or hose down to remove molds when seen. |
| Algae or green scum | All turfgrasses | Apply when first seen; reapply as needed. | Tersan LSR WP 80% (2 to 4 oz.)<br>Fore WP 80% (2 to 4 oz.)<br>copper sulfate (1 to 2 oz.) |
| Moss | All turfgrasses | Apply when first seen; reapply as needed. | ferrous ammonium sulfate (16 oz.) |

[a] Causal fungus listed in parentheses.

[b] Denotes either fungicide, coined name of that material, or representative trade names. Mention of a trade name or proprietary product does not constitute warranty of the product and does not imply approval of this material to the exclusion of comparable products that may be equally suitable. Except where indicated, all materials should be applied in 3 to 5 gal. water per 1,000 sq. ft. Use lower fungicide rates in *preventive* programs, higher rates for *curative* programs. Only one from each recommended group of preparations need be used.

[c] Other fungicides that control Typhula blight but not Fusarium patch include Thiram WP 75% (8 to 10 oz. per 1,000 sq. ft.) and cadmium compound (see label).

[d] Fungicides that control Fusarium patch but not Typhula blight include Tersan 1991 WP 50% (3 to 8 oz. per 1,000 sq. ft.), Daconil 2787, Fore, Mertect, and Tobaz (see labels).

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JOHN B. CLAAR, Director, Cooperative Extension Service, University of Illinois at Urbana-Champaign.

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